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Report of the Working Party on Pollution and Energy (GRPE) on its seventy-sixth session

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I. Attendance

1. The Working Party on Pollution and Energy (GRPE) held its seventy-sixth session from 9 to 12 January 2018, with Mr. A. Rijnders (Netherlands) as Chair. Experts from the following countries participated in the work following Rule 1(a) of the Rules of Procedure of the World Forum for Harmonization of Vehicle Regulations (WP.29) (TRANS/WP.29/690, as amended): Austria; Canada; China; Czech Republic; France; Germany; Hungary; India; Italy; Japan; Netherlands; Norway; Poland; Republic of Korea (Korea); Romania, Russian Federation; San Marino; Spain; Sweden; Switzerland; United Kingdom of Great Britain and Northern Ireland (UK) and the United States of America (USA). Experts from the European Commission (EC) also participated. Experts from the following non-governmental organizations took part in the session: Association for Emissions Control by Catalyst (AECC); European Liquefied Petroleum Gas Association (AEGPL); International Motor Vehicle Inspection Committee (CITA); European Association of Automobile Suppliers (CLEPA/MEMA/JAPIA); European Garage Equipment Association (EGEA); European Tyre & Rubber Manufacturers Association (ETRMA); European Association of Internal Combustion Engine Manufacturers (EUROMOT); International Automobile Federation International Automobile Federation (FIA); International Association for Natural Gas Vehicles (IANGV/NGV Global); International Council on Clean Transportation (ICCT); International Motorcycle Manufacturers Association (IMMA) and International Organization of Motor Vehicle Manufacturers (OICA).

II. Adoption of the agenda (agenda item 1)

Documentation: ECE/TRANS/WP.29/GRPE/2018/1 and Add.1
Informal documents GRPE-76-01, GRPE-76-09 and GRPE-76-11

2. GRPE adopted the provisional agenda prepared for the seventy-sixth session (ECE/TRANS/WP.29/GRPE/2018/1 and Add.1), as updated and consolidated in GRPE-76-11, including the informal documents tabled for the session that were submitted by 8 January 2018. GRPE took note of GRPE-76-01 on the organization of GRPE Informal Working Group (IWG) meetings held during the week.

3. The informal documents distributed before and during the GRPE session are listed in Annex I. Annex II lists the informal meetings held in conjunction with the GRPE session. Annex III lists the IWGs of GRPE, task forces and subgroups, giving details on their Chairs, Secretaries and the end of mandates.

4. The secretariat introduced GRPE-76-09, announcing that the next GRPE session would take place on 6-8 June 2018 and recalling the corresponding deadline (9 March 2018) for the submission of official documents. The Chairs and Secretaries of IWGs were invited to approach the secretariat to define the calendar of IWGs meetings for the June 2018 GRPE session.

5. The Officer-in-Charge of the Sustainable Transport Division informed GRPE of the selection of a new GRPE Secretary following the resignation of Mr. Gangonells. He thanks Mr. Guichard for having temporarily assumed the role of Secretary of GRPE until a new staff member would be recruited. He also informed GRPE of the nomination of Mr. Li Yuwei as newly appointed Director for the Division following the retirement of Ms. E. Molnar.

III. Report on the last session of the World Forum for Harmonization of Vehicle Regulations (WP.29) (agenda item 2)

Documentation: ECE/TRANS/WP.29/1131
ECE/TRANS/WP.29/1135
Informal document GRPE-76-10

6. The secretariat introduced GRPE-76-10 and reported on relevant items discussed during the 172nd and 173rd sessions of the World Forum for Harmonization of Vehicle Regulations (WP.29). The Secretary referred to ECE/TRANS/WP.29/1131 and ECE/TRANS/WP.29/1135 for further details.

IV. Light vehicles (agenda item 3)

A. Regulations Nos. 68 (Measurement of the maximum speed, including electric vehicles), 83 (Emissions of M_1 and N_1 vehicles), 101 (CO_2 emissions/fuel consumption) and 103 (Replacement pollution control devices)

Documentation: ECE/TRANS/WP.29/GRPE/2018/6
ECE/TRANS/WP.29/GRPE/2018/7
Informal documents GRPE-76-03, GRPE-76-04, GRPE-76-22, GRPE-76-17, GRPE-76-32 and GRPE-76-34

7. The expert from OICA introduced ECE/TRANS/WP.29/GRPE/2018/6 proposing an editorial correction that removes possible misinterpretation. GRPE adopted the proposal.

8. The expert from OICA introduced ECE/TRANS/WP.29/GRPE/2018/7 aimed at clarifying provisions on Selective Catalytic Reduction (SCR) systems. The expert from EC proposed editorial corrections (GRPE-76-34) to ECE/TRANS/WP.29/GRPE/2018/7. GRPE adopted the proposal as reproduced in Annex IV.

9. GRPE requested the secretariat to submit ECE/TRANS/WP.29/GRPE/2018/6 and Annex IV to the report to WP.29 and the Administrative Committee of the 1958 Agreement (AC.1) for consideration and vote at their June 2018 sessions as draft Supplements 11 and 7 to the 06 and the 07 series of amendments to UN Regulation No. 83.

10. The expert from OICA also presented GRPE-76-22 introducing GRPE-76-03 and GRPE-76-04, proposing to clarify the rules related to the selection of driving modes for testing of Off-Vehicle-Charging Hybrid Electric Vehicles (OVC-HEV). The Netherlands had some comments on the proposals GRPE-76-03 and GRPE-76-04 since the new text opens the door for interpretation plus the absence of any type approval authority confirmation. The Chair asked the cooperation of OICA and the Netherlands to work on an improved text. GRPE supported the intention of the proposal.

11. The expert from EC presented GRPE-76-32 proposing to amend the definitions for bi-fuel vehicles and align these definitions with those in UN Global Technical Regulation (UN GTR) No. 15. GRPE supported the intention of the proposal.

12. GRPE agreed to reconsider at the June 2018 session GRPE-76-03, GRPE-76-04 and GRPE-76-32. GRPE requested the experts from OICA and EC to combine the documents in one formal document.

13. GRPE reviewed the letter sent by the expert from Malta (GRPE-76-17). GRPE noted the statements of some delegations informing GRPE that they faced similar requests in the past and reporting that no evidence was provided that could convince of the environmental benefits of such retrofitted systems. GRPE noted also the need to verify the safety performance of such systems as the risk caused by the presence of hydrogen onboard of road vehicle is not insignificant. Experts from the automotive industry stated that they had reviewed the performance of such systems and that, due to the regulatory pressure on the industry concerning the CO_2 performance of their products, they would have introduced such technologies on their vehicles, if the benefits would have been demonstrated. They also noted that hydrogen cause damage to the materials used in engines and that the retrofitting such systems on existing vehicles not foreseen for the use on hydrogen could pose durability issues. GRPE requested the secretariat to note in the session report that GRPE has not received sufficient evidences of benefits from these systems to start regulatory activities. GRPE expressed the idea that any country willing to approve such system on the national basis may wish to take into consideration the usual emission tests (Types I, II, III, and IV), low temperature tests, the durability (including Type V) and OBD provisions.

B. Global Technical Regulations Nos. 15 on Worldwide harmonized Light vehicles Test Procedures (WLTP) and 19 (Evaporative emission test procedure for the Worldwide harmonized Light vehicle Test Procedures (WLTP EVAP)

Documentation: ECE/TRANS/WP.29/GRPE/2018/2
ECE/TRANS/WP.29/GRPE/2018/4
ECE/TRANS/WP.29/GRPE/2018/8
Informal documents GRPE-76-05, GRPE-76-06-Rev.1, GRPE-76-24, GRPE-76-25 and GRPE-76-26-Rev.1

14. The Chair of the IWG on the Worldwide harmonized Light vehicles Test Procedures (WLTP) reported on the ongoing activities (GRPE-76-25). He confirmed that the IWG on WLTP would need some additional time to finalize all Phase 2 activities due to the complex and heavy workload. The Chair of GRPE noted that the mandate of the IWG on WLTP had been extended until December 2019.

15. The Chair of the IWG on WLTP introduced ECE/TRANS/WP.29/GRPE/2018/2 proposing the draft Amend. 4. to UN GTR No. 15 as well as the corresponding report ECE/TRANS/WP.29/GRPE/2018/8 on the development of this amendment.

16. The drafting coordinator of the IWG on WLTP presented amendments to ECE/TRANS/WP.29/GRPE/2018/2 as reflected in GRPE-76-26-Rev.1 on amendments to GTR No. 15.

17. GRPE adopted ECE/TRANS/WP.29/GRPE/2018/2 as amended by Addendum 1 to this report and requested the secretariat to submit it to WP.29 and the Executive Committee of the 1998 Agreement (AC.3) for consideration and vote at their June 2018 sessions as draft Amendment 4 to GTR No. 15. GRPE also adopted the technical report (ECE/TRANS/WP.29/GRPE/2018/8) and requested the secretariat to submit it to WP.29 and AC.3 for consideration and vote at their June 2018 sessions.

18. As introduced by the Chair of the IWG on WLTP, GRPE also adopted ECE/TRANS/WP.29/GRPE/2018/4 (amended by GRPE-76-05) as reproduced in Addendum 2 to this report, proposing draft Amend. 1 to the UN GTR No. 19 (WLTP EVAP) as well as the corresponding report on the development of this amendment (GRPE-76-06-Rev.1) as reproduced in Annex V. GRPE requested the secretariat to submit

Addendum 2 and Annex V to WP.29 and AC.3 for consideration and vote at their June 2018 sessions as draft Amendment 1 to GTR No. 19.

19. The expert from EC, leading the task force on the transposition of WLTP into the 1958 Agreement, GRPE-76-24 on the activities of his group with the development of three alternatives for the construction of a UN Regulation on WLTP, which were presented to the IWG on International Whole Vehicle Type Approval (IWVTA). He recalled the task force's intention to proceed with a new series of amendments (08) of the existing Regulations Nos. 83 on emissions, including, e.g. Real Driving Emissions (RDE) and that would refer to the new UN Regulation on WLTP to gain approval for tests Types 1 and 4.

20. GRPE discussed the possible alternatives to structure the future UN Regulation on WLTP to address regional specificities. GRPE decided to request the secretariat to consult the Office of Legal Affairs (OLA) as noted in the Appendix of GRPE-76-24.

21. GRPE acknowledged the progress made by the IWG on WLTP and noted the request for a meeting room for two days during the GRPE week in June 2018.

V. Heavy duty vehicles (agenda item 4)

A. Regulations Nos. 49 (Emissions of compression ignition and positive ignition (LPG and CNG) engines) and 132 (Retrofit Emissions Control devices (REC))

Documentation: ECE/TRANS/WP.29/GRPE/2018/9
ECE/TRANS/WP.29/GRPE/2018/10
Informal documents GRPE-76-08, GRPE-76-13 and GRPE-76-16

22. The expert from OICA presented ECE/TRANS/WP.29/GRPE/2018/9 on a proposal for a draft Supplement 6 to the 06 series of amendments to UN Regulation No. 49 in order to introduce a clarification. GRPE adopted this proposal and requested the secretariat to submit it to WP.29 and AC.1 for consideration and vote at their June 2018 sessions as draft Supplement 6 to the 06 series of amendments to UN Regulation No. 49.

23. The expert from OICA also presented ECE/TRANS/WP.29/GRPE/2018/10 with requirements on Engine Control Unit torque signal validation, random check and rounding of test results. The expert from EC proposed clarifications (GRPE-76-16). GRPE adopted the proposal as amended and reproduced in Annex VI and requested the secretariat to submit it to WP.29 and AC.1 for consideration and vote at their June 2018 sessions as draft Supplement 10 to the 05 series of amendments to UN Regulation No. 49.

24. The expert from Switzerland presented an update (GRPE-76-08)to his presentation at a previous session of GRPE (GRPE-75-06) on manipulations on EURO V and VI trucks by aftermarket suppression of AdBlue injection . GRPE invited the expert from Switzerland to inform GRPE of new developments if any.

25. The expert from the European Automobile Manufacturers Association (ACEA) informed GRPE about a workshop hold in Brussels on this matter. He offered to share information on the outcome of this workshop.

26. The expert from EC introduced GRPE-76-13 on a proposal for amendments to UN Regulation No. 132 to align this Regulation with the provisions proposed under agenda item 6 (see para. 32).

27. GRPE requested the secretariat to distribute this proposal with an official symbol at the June session 2018 of GRPE.

B. Global Technical Regulations Nos. 4 (World-wide harmonized Heavy Duty Certification procedure (WHDC)), 5 (World-Wide harmonized Heavy duty On-Board Diagnostic systems (WWH-OBD)) and 10 (Off-Cycle Emissions (OCE))

28. GRPE did not receive any new proposals.

VI. Regulations Nos. 85 (Measurement of the net power), 115 (LPG and CNG retrofit systems), 133 (Recyclability of motor vehicles) and 143 (Heavy Duty Dual-Fuel Engine Retrofit Systems (HDDF-ERS)) (agenda item 5)

Documentation: ECE/TRANS/WP.29/GRPE/2018/5
Informal documents GRPE-76-02 and GRPE-76-23

29. The expert from OICA presented ECE/TRANS/WP.29/GRPE/2018/5 as amended by GRPE-76-23 proposing a solution for the concern raised by the expert from UK in GRPE-75-13 and corrects a long standing error in a formula shown by OICA in GRPE-75-12. GRPE adopted the proposal as reproduced in Annex VII and requested the secretariat to submit it to WP.29 and AC.1 for consideration and vote at their June 2018 sessions as draft Supplement 8 to UN Regulation No. 85.

30. The expert from Italy introduced GRPE-76-02 on the need to update UN Regulation No. 115 and the need to introduce a reference to WLTP instead of emission tests performed on the basis of the former test cycle (New European Driving Cycle (NEDC)). GRPE agreed with Italy that performing a back to back test on the basis of the NEDC test cycle would not make sense if the original type of vehicle would be type-approved on the basis of WLTP. Recalling para. 1.5 of UN Regulation No.115, which requires the modified vehicle to fulfil all the provisions of the Regulation for which the type approval has initially been granted, GRPE confirmed that the Type I test should be performed with the same cycle used during the approval of the original type of vehicle.

31. GRPE invited the expert from Italy and interested experts to consider developing a proposal for amendments to UN Regulation No. 115. The experts from AEGPL and IANGV/NGV Global volunteered to contribute to the work proposed by the expert from Italy.

VII. Agricultural and forestry tractors, non-road mobile machinery (agenda item 6)

A. Regulations Nos. 96 (Diesel emission (agricultural tractors)) and 120 (Net power of tractors and non-road mobile machinery)

Documentation: ECE/TRANS/WP.29/GRPE/2018/3
Informal documents GRPE-76-07, GRPE-76-12, GRPE-76-14 and GRPE-76-15

32. The expert from EC presented (GRPE-76-15) introducing ECE/TRANS/WP.29/GRPE/2018/3 with a proposal for a draft 05 series of amendments to UN Regulation No. 96 to harmonize it with the new European Union Regulation (2016/1628) on Non-Road Mobile Machinery (NRMM) with some corrections by GRPE-76-12. GRPE adopted the proposal as amended (GRPE-76-12) and requested the secretariat to submit

ECE/TRANS/WP.29/GRPE/2018/3 and Annex IX (to this report) to WP.29 and AC.1 for consideration and vote at their June 2018 sessions as draft 05 series of amendments to UN Regulation No. 96.

33. The expert from EC also introduced GRPE-76-14 proposing a new 02 series of amendments to UN Regulation No. 120. GRPE adopted the proposal and requested the secretariat to submit Addendum 3 to the report to WP.29 and AC.1 for consideration and vote at their June 2018 sessions as draft 02 series of amendments to UN Regulation No. 120.

34. The expert from EUROMOT introduced GRPE-76-07 and expressied the concern of his organization on tampering of NRMM after treatment and ECUs by legal persons. EUROMOT informed the GRPE that they would support activities from Contracting Parties to address these concerns. GRPE noted EUROMOT'sconcerned and agreed on potential follow-ups, noting the efforts required from manufacturers due to anti-tampering provisions in the relevant UN Regulations.

B. Global Technical Regulation No. 11 (Non-road mobile machinery engines)

35. GRPE did not receive any new proposal to amend UN GTR No. 11. The secretariat mentioned the achievements under agenda item 6(a) and highlighted the potential need to harmonize UN Regulation No. 96 and UN GTR No. 11 in the near future.

VIII. Particle Measurement Programme (PMP) (agenda item 7)

Documentation: Informal document GRPE-76-33

36. The Chair of the IWG on Particle Measurement Programme (PMP) presented a status report on the activities of the group on exhaust and non-exhaust particle emissions (GRPE-76-33). He reported on the ongoing activities: (a) the Round Robin tests scheduled to evaluate the robustness of exhaust particles determination with a size below 23 down to 10 nanometre, (b) the Particulate Number counting from Raw Exhaust via Fixed dilution, (c) the Round Robin Test activities on Particle Number Counter, (d) The Horizon 2020 Projects monitoring, (e) the particle emissions from gas engines and (f) the WLTP low temperature PN testing. On non-exhaust particle emissions: he reported on brake wear particles measurement (braking test cycle reflecting real-world conditions) and the corresponding validation activities of the rig test method that were being developed.

37. GRPE acknowledged the progress made by the IWG on PMP and noted that the group had no reques. for a meeting room during the GRPE week in June 2018.

IX. Motorcycles and mopeds (agenda item 8)

A. Regulations Nos. 40 (Emission of gaseous pollutants by motorcycles) and 47 (Emission of gaseous pollutants of mopeds)

38. GRPE did not receive any new proposal to amend UN Regulations Nos. 40 and 47.

B. Environmental and Propulsion Performance Requirements (EPPR) for L-category vehicles

Documentation: Informal documents GRPE-76-28 and GRPE-76-29

39. The Chair of the IWG on Environmental and Propulsion Performance Requirements for L-category vehicles (EPPR) presented a status report (GRPE-76-29) on the activities. He mentioned the current work on the development of amendments to GTR No. 2 as reflected in GRPE-76-28. He underlined that the work on On-Board Diagnostic systems (OBD) 2 Stage II that begun in 2018 and was expected to be completed in 2019. In an answer to a question raised, he confirmed that the group would address the performance of electric powered two wheelers in a second stage.

40. GRPE noted the ongoing discussion on the difficulties to measure particulate matters for vehicles with two-stroke engines and potential interactions with PMP. GRPE acknowledged the progress made by the IWG on EPPR and noted the request for a meeting room for one day during the GRPE week in June 2018.

C. Global Technical Regulation No. 2 (World-wide Motorcycle emissions Test Cycle (WMTC)) 17 (Crankcase and evaporative emissions of L-category vehicles) and 18 (On-Board Diagnostic (OBD) systems for L-category vehicles)

41. GRPE did not receive any new proposal.

X. Electric Vehicles and the Environment (EVE) (agenda item 9)

Documentation: Informal document GRPE-76-30

42. The Chair of the IWG on Electric Vehicles and the Environment (EVE) presented a status report on the ongoing activities of the group (GRPE-76-30) under the threeareas of work. First, he explained the ongoing work on GTR development for the test procedure to determine power of electrified vehicles on the basis of the International Organization for Standardization (ISO) method(s). He mentioned the work plan and the priority given to the reference method and the development of the candidate method, if time and resources permit validation. He requested input from GRPE on whether this work should be done as an annex to the UN GTR No. 15 or as a standalone UN GTR. Second, he reported on the continuous research on battery durability and referred to activities from the Joint Research Centre (JRC) on a battery life parameterized simulation model validated by on-road testing (led by Canada). He highlighted that the final recommendations, likely to be prepared until 2019, would include a recommendation to seek authorization for relevant additional activities such as UN GTR development or may recommend concluding the topic. Third, he informed GRPE that the IWG on EVE had made a presentation to the Group of Experts on Energy Efficiency (GEEE) to seek their partnership on the project to assess upstream emissions from electric vehicles, that GEEE had been receptive to the idea and endorsed the proposal for the Group of Expert on Cleaner Electricity Production (CEP) to consider this work, with the support of the IWG on EVE.

43. GRPE acknowledged the progress of the IWG on EVE and noted the request for a meeting room for half a day during the GRPE week in June 2018.

XI. Mutual Resolution No. 2 (M.R.2) (agenda item 10)

44. GRPE did not receive any new proposal to amend M.R.2.

XII. International Whole Vehicle Type Approval (IWVTA) (agenda item 11)

Documentation: Informal document GRPE-76-31

45. The GRPE Ambassador to the IWG on International Whole Vehicle Type Approval (IWVTA) presented a status report (GRPE-76-31) of the IWG on IWVTA.

46. He informed GRPE that Revision 3 of the 1958 Agreement entered into force on 14 September 2017. He mentioned that the IWG reviewed the options to transpose UN GTR No. 15 into a new UN Regulation on WLTP and excluded option 3 (see para. 19). He mentioned the "Questions and Answers" document prepared on Revision 3 and on UN Regulation No. 0. He invited interested experts to consult these documents. He concluded his intervention by mentioning the difficulties faced by UNECE that was to finance the Database for the Exchange of Type Approval documentation (DETA) necessary for the proper functioning of IWVTA.

XIII. Vehicles Interior Air Quality (VIAQ) (agenda item 12)

Documentation: Informal documents GRPE-76-27 and GRPE-76-35

47. The Vice-Chair of the IWG on Vehicles Interior Air Quality (VIAQ) presented a status report on the ongoing activities of the group (GRPE-76-35). He recalled that the original mandate of the group ended in November 2017. He highlighted the conclusion of the work by the tabled proposal for a new Mutual Resolution on recommendations to harmonize test procedures of interior air emissions generated from interior materials (ECE/TRANS/WP.29/2017/136) which was adopted by WP.29 and AC.3 during 173rd WP.29 session in Geneva (14-17 November 2017). He recalled that WP.29 had endorsed the extension of the mandate of the IWG on VIAQ until November 2020 to extend the work and consider not only emissions generated by interior materials, but also gases from other sources that enter into the vehicle cabin.

48. As Chair for the new stage of the IWG on VIAQ, the expert from the Russian Federation highlighted the existing standards on VIAQ in his country. He presented the revised Terms of Reference for the IWG on VIAQ (GRPE-76-27) which were adopted by GRPE, as reproduced in Annex VIII.

49. GRPE acknowledged the progress made by the IWG on VIAQ and noted the request for a meeting room for half a day during the GRPE week in June 2018.

XIV. Exchange of information on emission requirements (agenda item 13)

Documentation: Informal documents WP.29-172-21, GRPE-76-18 and GRPE-76-19

50. The expert from Japan presented GRPE-76-18 on the activities of his Country on Real Driving Emission ("Japan RDE"). The expert from OICA presented GRPE-76-19 with a non-exhaustive list of countries (e.g. Brazil, China, India, Japan, Republic of Korea) working on non-harmonized requirements on Real Driving Emissions. The Secretary of GRPE mentioned the difficulties faced by GRPE to transpose UN GTR No. 15 due to regional options and variants. He called for early harmonization of technical provisions on Real Driving Emissions. GRPE discussed the proposal of the expert from OICA to have a workshop would be organized in order to discuss Global RDE. The secretariat agreed to collaborate in the hosting of such workshop. The Chair of GRPE welcomed the

presentation and invited Contracting Parties to continue this exercise of exchange of information on emissions requirements in the next sessions. He urged the delegations to not only focus on their domestic needs but also leave flexibility for negotiation of globally harmonized requirements. GRPE agreed to add a corresponding agenda item on the agenda of GRPE.

51. The expert from China informed GRPE on activities on the China Automotive Testing Cycle (CATP), following a question raised by the Chair (WP.29-172-21).

XV. Any other business (agenda item 14)

Documentation: Informal documents GRPE-76-20, GRPE-76-21 and GRSG-113-39

52. The expert from OICA briefly introduced GRPE-76-20 on non-harmonized fuel economy provisions for heavy duty vehicles in various countries and regions. The expert from OICA proposed that a workshop would be organized in order to discuss this subject. The secretariat agreed to collaborate in hosting the workshop. GRPE agreed to add a corresponding item on the agenda of GRPE.

53. The expert from OICA briefly introduced GRPE-76-21, proposing to amend UN Regulation No. 24. He agreed to prepare an informal document along the lines in his presentation.

54. The secretariat briefly introduced GRSG-113-39 to inform GRPE on activities that could be relevant. He invited delegates to consult the document and submit remarks if necessary.

XVI. Provisional agenda for the next session

A. Next GRPE session

55. The next GRPE session, including the IWG meetings, is scheduled to be held in Geneva, Palais des Nations, starting on Monday, 4 June 2018, from 9.30 a.m. until Friday, 8 June 2018, at 5.30 p.m., subject to confirmation by the secretariat (see GRPE-77-01). Interpretation services would be provided from 6 June (2.30 p.m.) to 8 June (12.30 p.m.) 2018.

B. Provisional agenda for the next proper GRPE session

56. GRPE agreed on the following provisional agenda for its next session:

1. Adoption of the agenda.
2. Report on the last sessions of the World Forum for Harmonization of Vehicle Regulations (WP.29).
3. Light vehicles:
   (a) Regulations Nos. 68 (Measurement of the maximum speed, including electric vehicles), 83 (Emissions of M_1 and N_1 vehicles), 101 (CO_2 emissions/fuel consumption) and 103 (Replacement pollution control devices);
   (b) Global Technical Regulations Nos. 15 (Worldwide harmonized Light vehicles Test Procedures (WLTP)) and 19 (Evaporative emission test

procedure for the Worldwide harmonized Light vehicle Test Procedure (WLTP EVAP));

(c) Worldwide harmonized Real Driving Emissions test procedure.

4. Heavy duty vehicles:

(a) Regulations Nos. 49 (Emissions of compression ignition and positive ignition (LPG and CNG) engines) and 132 (Retrofit Emissions Control devices (REC));

(b) Global Technical Regulations Nos. 4 (World-wide harmonized Heavy duty Certification procedure (WHDC)), 5 (World-Wide harmonized Heavy duty On-Board Diagnostic systems (WWH-OBD)) and 10 (Off-Cycle Emissions (OCE));

(c) Worldwide provisions for Heavy Duty vehicles Fuel Economy.

5. Regulations Nos. 85 (Measurement of the net power), 115 (LPG and CNG retrofit systems), 133 (Recyclability of motor vehicles) and 143 (Heavy Duty Dual-Fuel Engine Retrofit Systems (HDDF-ERS)).

6. Agricultural and forestry tractors, non-road mobile machinery:

(a) Regulations Nos. 96 (Diesel emission (agricultural tractors)) and 120 (Net power of tractors and non-road mobile machinery);

(b) Global Technical Regulation No. 11 (Non-road mobile machinery engines).

7. Particle Measurement Programme (PMP).

8. Motorcycles and mopeds:

(a) Regulations Nos. 40 (Emission of gaseous pollutants by motor cycles) and 47 (Emission of gaseous pollutants of mopeds);

(b) Environmental and Propulsion Performance Requirements (EPPR) for L-category vehicles;

(c) Global Technical Regulations Nos. 2 (World-wide Motorcycle emissions Test Cycle (WMTC)), 17 (Crankcase and evaporative emissions of L-category vehicles) and 18 (On-Board Diagnostic (OBD) systems for L-category vehicles).

9. Electric Vehicles and the Environment (EVE).

10. Mutual Resolution No. 2 (M.R.2).

11. International Whole Vehicle Type Approval (IWVTA).

12. Vehicles Interior Air Quality (VIAQ).

13. Exchange of information on emission requirements.

14. Election of Officers.

15. Any other business.

C. Informal meetings scheduled to be held in conjunction with the next GRPE session

57. The informal meetings were scheduled to be held as follows, subject to confirmation:

Date	*Group*	*Acronym*	*Time*
Monday, 4 June 2018	Worldwide harmonized Light vehicles Test Procedure	WLTP	9.30 a.m. – 12.30 p.m. 2.30 p.m. – 5.30 p.m.
Tuesday, 5 June 2018	Worldwide harmonized Light vehicles Test Procedure	WLTP	9.30 a.m. – 12.30 p.m.
	Electric Vehicles and the Environment	EVE	2.30 p.m. – 5.30 p.m.
Wednesday, 6 June 2018	Environmental and Propulsion Performance Requirements of L-category vehicles	EPPR	9.30 a.m. – 12.30 p.m. 2.30 p.m. – 5.30 p.m.
	Vehicle Interior Air Quality (provided that a meeting room can be allocated)	VIAQ	2.30 p.m. – 5.30 p.m.

58. The agendas of these meetings will be prepared by the respective Technical Secretaries and distributed to the members of each group prior to each meeting.

Annex I

[English only]

List of informal documents (GRPE-76-) distributed without an official symbol before and during the session

No.	*(Author) Title*	*Follow-up*
1	(Secretariat) Informal meetings in conjunction with the GRPE (proper) session: schedule and rooms reservation	A
2	(Italy) - Proposal for amendments to UN Regulation No. 115	A
3	(OICA) - Proposal for Supplements to the 06 and 07 series of amendments to Regulation No. 101	C
4	(OICA) - Proposal for a new Supplement to the 06 and 07 series of amendments to Regulation No. 83 (Emissions of M1 and N1 vehicles)	C
5	(WLTP) Proposal for amendments to ECE/TRANS/WP.29/GRPE/2018/4 - UN GTR No. 19 (EVAP)	B
6r1	(WLTP) Revised proposal for a technical report on the development of Amend. 1 to UN GTR No. 19 on Evaporative emission test procedure for the WLTP	B
7	(EUROMOT) EUROMOT concerns regarding tampering of NRMM after-treatment and ECUs by legal persons	A
8	(Switzerland) Trucks manipulation by suppression of AdBlue Injection - Situation End of December 2017	A
9	(Secretariat) General information	A
10	(Secretariat) Highlights of the June and November 2017 sessions of WP.29	A
11	(Secretariat) Updated and consolidated provisional agenda	B
12	(EC) Proposal for amendments to ECE/TRANS/WP.29/GRPE/2018/3 - UN Regulation No. 96	B
13	(EC) Proposal for Supplement 1 to the 01 series of amendments to Regulation No. 132 (REC)	D
14	(EC) Proposal for a new series of amendments to UN Regulation No. 120 (Net power (T and NRMM))	B
15	(EC) Introduction of GRPE-76-12, GRPE-76-13 and GRPE-76-14	A
16	(EC) Proposals for amendments to ECE/TRANS/WP.29/GRPE/2018/10 - UN Regulation No. 49	B
17	(Malta) Letter	A
18	(Japan) Development of Japan's RDE procedure	A
19	(OICA) Global RDE	A
20	(OICA) HD Fuel Economy - Proposal to get global harmonization	A
21	(OICA) Proposal for amendments to UN Regulation No. 24	A
22	(OICA) OVC-HEV Certification according to UN R83/R101	A
23	(UK/OICA) Proposal for amendments to ECE/TRANS/WP.29/GRPE/2018/5	B
24	(WLTP) Transposition of UN GTR No. 15 into UN Regulations	A
25	(WLTP) Status report of the IWG on WLTP	A
26r1	(WLTP) Revised proposal for amendments to ECE/TRANS/WP.29/GRPE/2018/2	B
27	(VIAQ) Proposal for revised ToR for the IWG on VIAQ.	B
28	(EPPR) Draft UN GTR	A

No.	*(Author) Title*	*Follow-up*
29	(EPPR) Status report	A
30	(EVE) Status report	A
31	(IWVTA) Report to GRPE of the GRPE Ambassador to the IWG on IWVTA	A
32	(EC) Proposal for amendments to ECE/TRANS/WP.29/GRPE/2018/6 and ECE/TRANS/WP.29/GRPE/2018/7 (UN Regulation No. 83)	C
33	(PMP) Status report	A
34	(EC) Proposal for amendments to ECE/TRANS/WP.29/GRPE/2018/7	B
35	(VIAQ) Status report	A

Notes:

A Consideration by GRPE completed or to be superseded.

B Adopted.

C Further consideration on the basis of a revised proposal.

D Distribute at the June 2018 session with an official symbol.

Annex II

[English only]

Informal meetings held in conjunction with the GRPE session

Date	*Time*	*Group*	*Acronym*
8 January 2018	2:30 p.m. - 5:30 p.m.	Electric Vehicles and the Environment	EVE
9 January 2018	9:30 a.m. - 12:30 p.m.	Worldwide harmonized Light vehicles Test Procedure	WLTP
	2:30 p.m. - 5:30 p.m.	Worldwide harmonized Light vehicles Test Procedure	WLTP
10 January 2018	9:30 a.m. - 12:30 p.m.	Particle Measurement Programme	PMP
		Environmental and Propulsion Performance Requirements of L-category vehicles	EPPR
	2:30 p.m. - 5:30 p.m.	Environmental and Propulsion Performance Requirements of L-category vehicles	EPPR
		WLTP Sub-Group on Electrified Vehicles	EV
		Vehicle Interior Air Quality	VIAQ

Annex III

[English only]

List of GRPE informal working groups, task forces and subgroups

Name (Acronym) (Status)	*Chair or Co-chairs*	*Secretaries*	*End of mandate*
Environmental and Propulsion Performance Requirements of L-category vehicles (EPPR) (group)	Adolfo Perujo, Adolfo.PERUJO@ec.europa.eu	Daniela Leveratto, d.leveratto@immamotorcycles.org Hardik Makhija, hardik@siam.in	December 2020
Electric Vehicles and the Environment (EVE) (group)	Michael Olechiw, Olechiw.Michael@epamail.epa.gov Chen Chunmei (vice-Chair), chencm@miit.gov.cn Kazuyuki Narusawa (vice-Chair), narusawa@ntsel.go.jp	Andrew Giallonardo, Andrew.Giallonardo@ec.gc.ca	November 2019
Particle Measurement Programme (PMP) (group)	Giorgio Martini, giorgio.martini@jrc.ec.europa.eu	Caroline Hosier, chosier@ford.com	June 2019
Vehicle Interior Air Quality (VIAQ) (group)	Andrey Kozlov, a.kozlov@nami.ru Jong Soon Lim (vice-Chair), jongsoon@ts2020.kr	Andreas Wehrmeier, andreas.wehrmeier@bmw.de	November 2020
Worldwide harmonized Light vehicles Test Procedure (WLTP) – Phase 2 (group)	Robertus Cuelenaere, rob.cuelenaere@tno.nl Daisuke Kawano (vice-Chair), kawano@ntsel.go.jp	Noriyuki Ichikawa (co-Technical Secretary), noriyuki_ichikawa@mail.toyota.co.jp Markus Bergmann (co-Technical Secretary), markus.bergmann@audi.de	December 2019

Annex IV

[English only]

Adopted amendments to ECE/TRANS/WP.29/GRPE/2018/7

Adopted on the basis of GRPE-76-34 (see para. 8)

Note by the Secretariat: subject to reconfirmation by GRPE at its June 2018 session

Appendix 6,

Insert new paragraphs 1.1. and 1.2., to read:

"1.1. **The capacity of the reagent tank shall be such that a full reagent tank does not need to be replenished over an average driving range of 5 full fuel tanks providing the reagent tank can be easily replenished (e.g. without the use of tools and without removing vehicle interior trim. The opening of an interior flap, in order to gain access for the purpose of reagent replenishment, shall not be understood as the removal of interior trim). If the reagent tank is not considered to be easy to replenish as described above, the minimum reagent tank capacity shall be at least equivalent to an average driving distance of 15 full fuel tanks. However, in the case of the option in paragraph 3.5. of this appendix, where the manufacturer chooses to start the warning system at a distance which may not be less than 2,400 km before the reagent tank becomes empty, the above restrictions on a minimum reagent tank capacity shall not apply.**

1.2. In the context of this appendix, the term "average driving distance" shall be taken to be derived from the fuel or reagent consumption during a Type 1 test for the driving distance of a fuel tank and the driving distance of a reagent tank respectively."

Paragraph 2.1., amend to read:

"2.1. The vehicle shall include a specific indicator on the dashboard that informs the driver ~~of low levels of reagent in the reagent storage tank and of when the reagent tank becomes empty~~ **when reagent levels are below the threshold values specified in paragraph 3.5. of this appendix.**"

Paragraph 3.1., amend to read:

"3.1. The vehicle shall include a warning system consisting of visual alarms that informs the driver when **an abnormality is detected in the reagent dosing e.g. when emissions are too high,** the reagent level is low, ~~that the tank soon needs to be refilled,~~ **reagent dosing is interrupted,** or the reagent is not of a quality specified by the manufacturer. The warning system may also include an audible component to alert the driver."

Paragraph 3.4., amend the last sentence to read:

"3.4. . . . The continuous warning system may be temporarily interrupted by other warning signals providing **that they are** important safety related messages."

Paragraph 3.5., amend to read:

"3.5. The warning system shall activate at a distance equivalent to a driving range of at least 2,400 km in advance of the reagent tank becoming empty, **or at the choice of the manufacturer at the latest when the level of reagent in the tank reaches one of the following levels:**

(a) a level expected to be sufficient for driving 150 per cent of an average driving range with a complete tank of fuel; or

(b) 10 per cent of the capacity of the reagent tank,

whichever occurs earlier."

Paragraph 5.5., amend to read:

"5.5. In the case of interruption in reagent dosing activity the driver warning system as referred to in paragraph 3. shall be activated, which shall display a message indicating an appropriate warning. ~~This activation shall not be required where the interruption is demanded by the Engine Control Unit (ECU)~~ **Where the reagent dosing interruption is initiated by the engine system** because the vehicle operating conditions are such that the vehicle's emission performance does not require reagent dosing, **the activation of the driver warning system as referred to in paragraph 3 may be omitted,** provided that the manufacturer has clearly informed the Type Approval Authority when such operating conditions apply. If the reagent dosing is not rectified within 50 km of the activation of the warning system then the driver inducement requirements of paragraph 8. below shall apply."

Paragraph 6.2., amend the first sub-paragraph to read:

"6.2. The manufacturer shall demonstrate that use of the sensors referred to in paragraph 6.1. above and any other sensors on the vehicle, results in the activation of the driver warning system as referred to in paragraph 3. above, the display of a message indicating an appropriate warning (e.g. "emissions too high - check urea", "emissions too high - check AdBlue", "emissions too high - check reagent"), and the **activation of the** driver inducement system as referred to in paragraph 8.3. below, when the situations referred to in paragraphs 4.2., 5.4. or 5.5. above occur."

In the 06 series of amendments,

Paragraph 6.2., insert a second sub-paragraph to read:

"For the purposes of this paragraph these situations are presumed to occur if the applicable NOx limit of the table set out in paragraph 5.3.1.4. of this Regulation multiplied by a factor of 1.5 is exceeded. The NOx emissions during the test to demonstrate compliance with these requirements shall be no more than 20 per cent higher than the above threshold."

Paragraph 8.2., amend to read:

"8.2. The inducement system shall activate at the latest when the level of reagent in the tank reaches:

(a) In the case that the warning system was activated at least 2,400 km before the reagent tank was expected to become empty, a level ~~equivalent to~~ **expected to be sufficient for driving** the average driving range of the vehicle with a complete tank of fuel.

(b) In the case that the warning system was activated at the level described in paragraph 3.5.(a), a level expected to be sufficient for driving 75 per cent of the average driving range of the vehicle with a complete tank of fuel; or

(c) In the case that the warning system was activated at the level described in paragraph 3.5.(b), 5 per cent of the capacity of the reagent tank.

(d) In the case that the warning system was activated ahead of the levels described in both paragraph 3.5.(a) and 3.5.(b), whichever level described in (b) or (c) of this paragraph occurs earlier.

Where the alternative described in paragraph 6.1. is utilised, the system shall activate when the irregularities described in paragraphs 4 or 5 or the NOx levels described in paragraph 6.2. have occurred.

~~The system shall also activate when the failures in paragraphs 4., 5., or 6. above have occurred, depending on the NOx monitoring approach.~~ The detection of an empty reagent tank and the ~~failures~~ **irregularities** mentioned in paragraphs 4., 5., or 6. above shall result in the failure information storage requirements of paragraph 7. above **taking** ~~coming into~~ effect."

Paragraph 8.3.1., amend to read:

"8.3.1. A "no engine restart after countdown" approach allows a countdown of restarts or distance remaining once the inducement system activates. Engine starts initiated by the vehicle control system, such as start-stop systems, are not included in this countdown. Engine restarts shall be prevented immediately after:

(a) In the case that the inducement system was activated at least 2,400 km before the reagent tank was expected to become empty, the vehicle has travelled a distance expected to be sufficient for driving the average driving range of the vehicle with a complete tank of fuel since the activation of the inducement system, or

(b) In the case that the inducement system was activated at the level described in paragraph 8.2.(b), the vehicle has travelled a distance expected to be sufficient for driving 75 per cent of the average driving range of the vehicle with a complete tank of fuel since the activation of the inducement system, or

(c) In the case that the inducement system was activated at the level described in paragraph 8.2.(c), the vehicle has travelled a distance expected to be sufficient for driving the average driving range of the vehicle with 5 per cent of the capacity of the reagent tank, since the activation of the inducement system, or

(d) In the case that the inducement system was activated ahead of the levels described in both paragraph 8.2.(b) and 8.2.(c) but less than 2,400 km before the reagent tank was expected to become empty, whichever distance described in (b) or (c) of this paragraph is the shorter, or

the reagent tank becomes empty ~~or a distance equivalent to a complete tank of fuel has been exceeded since the activation of the inducement system, whichever occurs~~ **should this occur** earlier."

Paragraph 8.3.4., amend to read:

"8.3.4. A "performance restriction" approach restricts the speed of the vehicle after the inducement system activates. The level of speed limitation shall be noticeable to the driver and significantly reduce the maximum speed of the vehicle. Such limitation shall enter into operation gradually or after an engine start. Shortly before engine restarts are prevented, the speed of the vehicle shall not exceed 50 km/h. Engine restarts shall be prevented immediately after:

(a) In the case that the inducement system was activated at least 2,400 km before the reagent tank was expected to become empty, the vehicle has travelled a distance expected to be sufficient for driving the average driving range of the vehicle with a complete tank of fuel since the activation of the inducement system, or

(b) In the case that the inducement system was activated at the level described in paragraph 8.2.(b), the vehicle has travelled a distance expected to be sufficient for driving 75 per cent of the average driving range of the vehicle with a complete tank of fuel since the activation of the inducement system, or

(c) In the case that the inducement system was activated at the level described in paragraph 8.2.(c), the vehicle has travelled a distance expected to be sufficient for driving the average driving range of the vehicle with 5 per cent of the capacity of the reagent tank, since the activation of the inducement system, or

(d) In the case that the inducement system was activated ahead of the levels described in both paragraph 8.2.(b) and 8.2.(c) but less than 2400 km before the reagent tank was expected to become empty, whichever distance described in (b) or (c) of this paragraph is the shorter, or

the reagent tank becomes empty ~~or a distance equivalent to a complete tank of fuel has been exceeded since the activation of inducement system, whichever occurs~~ **should this occur** earlier."

Paragraph 8.4., amend to read:

"8.4. Once the inducement system has **prevented engine restarts** ~~fully activated and disabled the vehicle~~, the inducement system shall only be deactivated if ~~the quantity of reagent added to the vehicle is equivalent to 2,400 km average driving range, or~~ the **irregularities** ~~failures~~ specified in paragraphs 4., 5., or 6. of this appendix have been rectified **or if the quantity of reagent added to the vehicle meets at least one of the following criteria:**

(a) expected to be sufficient for driving 150 per cent of an average driving range with a complete tank of fuel; or

(b) at least 10 per cent of the capacity of the reagent tank.

After a repair has been carried out to correct a fault where the OBD system has been triggered under paragraph 7.2. above, the inducement system may be reinitialised via the OBD serial port (e.g. by a generic scan tool) to enable the vehicle to be restarted for self-diagnosis purposes. The vehicle shall operate for a maximum of 50 km to enable the success of the repair to be

validated. The inducement system shall be fully reactivated if the fault persists after this validation."

Delete paragraph 8.6. and renumber paragraphs 8.7. and 8.8. as 8.6. and 8.7.

Paragraph 9.3., amend to read:

"9.3. The instructions shall specify if consumable reagents have to be **replenished** ~~refilled~~ by the vehicle **driver** between normal maintenance intervals. They shall indicate how the **vehicle** driver should **replenish** ~~refill~~ the reagent tank. The information shall also indicate a likely rate of reagent consumption for that type of vehicle and how often it should be replenished."

Paragraph 9.4., amend to read:

"9.4. The instructions shall specify that use of, and **replenishing** ~~refilling~~ of, a required reagent of the correct specifications is mandatory for the vehicle to comply with the certificate of conformity issued for that vehicle type."

Paragraph 10., amend to read:

"10. Operating conditions of the after-treatment system

Manufacturers shall ensure that the emission control system retains its emission control function during all ambient conditions, especially at low ambient temperatures. This includes taking measures to prevent the complete freezing of the reagent during parking times of up to 7 days at 258 K (-15 °C) with the reagent tank 50 per cent full. If the reagent ~~has~~ **is** frozen, the manufacturer shall ensure that **the** reagent shall be ~~available~~ **liquefied and ready** for ~~use~~ **correct operation of the emission control system** within 20 minutes of the vehicle ~~starting~~ **being started** at 258 K (-15 °C) measured inside the reagent tank~~, so as to ensure correct operation of the emission control system~~."

Annex V

Technical report on the development of Amendment 1 to UN GTR No. 19 on WLTP EVAP

Adopted on the basis of GRPE-76-06-Rev.1 (see para. 18)

Technical report on the development of Amendment 1 to UN Global Technical Regulation No. 19 on Evaporative emission test procedure for the Worldwide harmonised Light vehicles Test Procedures (WLTP)

I. Introduction

1. During the seventy-fourth session of the Working Party on Pollution and Energy (GRPE) in January 2017, the Evaporative emission test procedure for the Worldwide harmonised Light vehicles Test Procedures (WLTP EVAP) Task Force (TF) submitted a working document and an informal document for the consideration of GRPE.

2. The working document ECE/TRANS/WP.29/GRPE/2017/3 (Proposal for a new UN Global Technical Regulation on Evaporative emission test procedure for the Worldwide harmonized Light vehicles Test Procedures), UN GTR No. 19, contained the new proposed test procedure to measure evaporative emission from non-sealed fuel tank systems.

3. Non-sealed fuel tank systems are mostly used in conventional vehicles with an internal combustion engine. Since these vehicles have a high chance of purging the fuel vapours inside the fuel tank systems and the canister(s) into the internal combustion engines, the pressure inside the fuel tank generated by fuel vapours is well maintained at low level.

4. From late 2016 to September 2017, thirteen meetings (including three face-to-face meetings and two drafting meetings) were held and the WLTP EVAP task force worked to include a test procedure covering the sealed fuel tank systems in UN GTR No. 19. These systems are expected to be used in the hybrid electric vehicles driven mainly by electric engines and in the future conventional vehicles.

5. Amendment 1 to UN GTR No. 19 complements the text of the UN GTR not only by adding descriptions of the test procedure for sealed fuel tank systems but also by adding other provisions related to non-sealed fuel tank systems which were raised along the discussions on sealed fuel tank systems.

6. The discussions of Amendment 1 were led by experts from Japan (Ms. Mayumi "Sophie" Morimoto) and the European Commission's Joint Research Center (Giorgio Martini). The drafting of the text was led by the expert from the European Commission (Serge Dubuc).

II. Sealed fuel tank systems - Test procedure development

A. Objectives

7. During parking events, the fuel temperature in the fuel tank system increases due to rising ambient temperature and solar radiation. As a result of the increased temperature and consequent evaporation of the fuel, as well as expansion of the air/fuel vapour mixture, the pressure inside the fuel tank system increases significantly. This may lead the evaporation of the lightest petroleum fractions with a corresponding increase of the pressure inside the fuel tank system. In non-sealed fuel tank systems, which are mostly used in conventional vehicles, the increase of the pressure inside the system is limited by the high probability of purging vapours inside the fuel tank system, and the pressure is vented mainly to the canister(s). The canister adsorbs and stores hydrocarbons (HC). However, this canister has a limited adsorbing capacity (depending on several factors of which the most important are the carbon quality, mass, and fuel specification as well as the ambient temperature) and must be periodically purged to desorb the stored hydrocarbons. This occurs during vehicle driving events since part of the combustion air flows through the canister removing the adsorbed hydrocarbons which are then burned inside the engine.

8. Due to the potentially limited operation time of the combustion engine in hybrid electric vehicles, the use of sealed fuel tank systems is one of the alternative solutions to the system described above to control evaporative emissions. A sealed fuel tank system is by design a closed system that can store fuel vapours inside the system up to the fuel tank relief pressure. In this case, no fuel vapour is vented to the canister nor to the atmosphere. However, the sealed fuel tank systems must be depressurised. This depressurisation is generally achieved by opening a pressure relief valve before refuelling to ensure a safe operation. The mixture of air and vapours released through the pressure relief valve are stored in the canister(s) which are then purged when the combustion engine runs.

9. In the case of very hot temperature conditions, the pressure inside the fuel tank system might exceed the fuel tank relief pressure which is designed to avoid the risk of a rupture of the sealed fuel tank system.

10. A technological option to limit the pressure increase inside the sealed fuel tank system due to a rising ambient temperature is insulating the tank itself. This means that the temperature of the fuel will remain lower than the ambient temperature. This option has been taken into account when developing the test procedure.

B. Approach

11. The following points were discussed during WLTP EVAP task force meetings:

- Discussion points related to sealed fuel tank system test procedure
  - Definitions and abbreviations
  - Test sequence – one continuous test or two separate tests (stand-alone puff loss test, and stand-alone hot soak loss and 48-hour diurnal test)
  - Fuel tank relief pressure requirement for sealed fuel tank system
  - Condition before puff loss loading to canister – soak temperature, soak duration, and pressure inside the fuel tank system after depressurisation
  - Overflow puff loss emissions check after depressurisation
  - Condition of diurnal breathing loss test for sealed fuel tank system

- Soak temperature

- Discussion points related to improvement of latest UN GTR No. 19
  - Vehicle preparation – baking of tyres
  - Type approval authority witness
  - BWC measurement

C. Amendments introduced in UN GTR No. 19

1. Sealed fuel tank system test procedure

1.1. Definitions and abbreviations

12. Definitions of "*NOVC-HEV*", "*HEV*" and "*HV*" were added by copying and pasting from UN GTR No. 15.

13. Definition of "*Monolayer tank*" was updated and the term was renamed to "*Monolayer non-metal tank*".

14. Definition of "*Sealed fuel tank system*" was updated. Whether to include "*Semi-sealed fuel tank system*" which might release the vapours and the pressure from system on first day of diurnal phase but the pressure relief valve would not open for subsequent days was discussed. Since we did not have enough data, the task force decided to discuss it at the next stage.

15. Definition of "*Evaporative emissions*" was updated to include hydrocarbon vapours lost from the fuel system immediately before refuelling of a sealed fuel tank.

16. Definitions of "*Depressurisation puff loss*", "*Depressurisation puff loss overflow*", "*Fuel tank relief pressure*" and "*Auxiliary canister*" were newly added since these terms are related to sealed fuel tank system test procedure.

17. Definition of "*2 gram breakthrough*" was newly added to improve GTR No. 19.

18. The abbreviation for rechargeable electric energy storage system was newly added since this term is related to the sealed fuel tank system test procedure.

19. Some terms in definitions and abbreviations were decapitalised for drafting purpose.

1.2. Test sequence – one continuous test or two separate tests (stand-alone puff loss test, and stand-alone hot soak loss and 48-hour diurnal test)

20. The test procedure of sealed fuel tank systems consists of two parts. One is the determination of the volume of the depressurisation puff loss loaded to the canister immediately before refuelling and its overflow from the canister. The other is the stand-alone hot soak loss and 48-hour diurnal test, which are the same as for non-sealed fuel tank system.

21. A 2 gram breakthrough loading of the non-sealed tank system was replaced by the depressurisation puff loss loading volume for subsequent procedures which are the hot soak loss test and the 48-hour diurnal test.

22. Japan proposed to set separate test sequences to improve testing efficiency. On the other hand, some vehicle manufacturers indicated there are some systems which cannot separate canister(s) from system, and this requires a continuous one test sequence. With consideration of those systems, the task force decided to have both one continuous test procedure and two separate tests.

1.3. Fuel tank relief pressure requirement for sealed fuel tank system

23. JRC proposed to set a minimum requirement for fuel tank relief pressure. This proposal was based on concerns for vehicles which would pass the type approval test but might emit significant amount of vapours when the temperature rises above 35°C in the market. Some vehicle manufacturers and Japan opposed this proposal since this proposal may eliminate the possibility of new technologies such as insulated fuel tank systems. To solve the concerns of both, the task force determined to have 2 conditions for the temperature profile during the 48-hour diurnal test, one for systems with a fuel tank relief pressure equal to or higher than 30kPa and another for those below 30kPa. This would provide manufacturers with the scope to develop systems which incorporate a wider range of new technologies.

24. The value of the fuel tank relief pressure to determine the condition of preparation was decided based on the study result provided by task force members. Their study was based on maximum monthly temperature of Rome, New Delhi and Kyoto. The study also included the estimation of the fuel tank pressure based on market fuel properties under the temperature condition of those cities. The task force decided to set 30kPa as a threshold by considering +5°C margin from maximum temperature.

1.4. Condition before puff loss loading to canister –soak temperature, soak duration, and pressure inside the fuel tank system after depressurisation

25. The soak temperature profile before puff loss loading to the canister was decided based on the 24-hour diurnal breathing loss test (DBL). After 11 hours, the temperature inside the soak room will reach to the maximum during the DBL profile. Therefore, the task force decided to use 11 hours as soak duration.

26. The pressure inside the system after depressurisation was decided as maximum 2.5 kPa above ambient pressure in normal vehicle operation and use. This is based on the pressure requirement inside the fuel tank system during run loss test of US EPA.

1.5. Overflow puff loss emissions check after depressurisation

27. Immediately before refuelling, the sealed fuel tank system will be depressurised before the fuel cap is opened. When depressurised, the pressure will be relieved to atmosphere through the canister. To avoid unexpected escape of vapours with those pressures, Japan proposed to include a check of overflow vapours from the canister during the sealed fuel tank system test procedure. After extensive discussions, the task force supported the proposal.

1.6. Condition of diurnal breathing loss test for sealed fuel tank system

28. As explained in paragraph 1.3., the task force decided to have two conditions for the temperature profile during the 48-hour diurnal test depending on the fuel tank relief pressure. The systems with fuel tank relief pressure equal to or higher than 30kPa will use a 20 to 35°C temperature profile, the same as a non-sealed fuel tank system. On the other hand, the system with a pressure lower than 30kPa should have a 20 to 38°C profile. This profile was decided based on estimated pressure of sealed fuel tank system at +5°C margin maximum temperature.

1.7. Soak temperature

29. Within UN GTR No. 19 there are two different types of soak which are undertaken at different temperatures. The soak which occurs before the dynamometer test should be carried at 23°C, because dynamometer test is also undertaken at 23°C. The soak that takes

place prior to the following sequences are carried out at 20°C because these sequences start from 20°C.

(a) The diurnal test (for both non-sealed fuel tank system and sealed fuel tank system test procedures);

(b) The conditioning for puff loss loading (for sealed fuel tank system test procedure only);

(c) Fuel tank depressurisation (for sealed fuel tank system test procedure only).

30. However, there exists one exemption in the sealed fuel tank system test procedure. This is where the dynamometer test starts after soaking at 20°C (paragraph 6.6.1.12. followed by paragraph 6.5.6. of Annex 1 of Amendment 1 to UN GTR No. 19). After intensive discussion within TF members, they decided to skip another soak at 23°C because it would cause a burden to soak again for at least another 6 hours.

2. Discussion points related to improvement of latest GTR No. 19

2.1 Vehicle preparation – baking of tyres

31. During seventy-fourth session of GRPE, The European Tyre & Rubber Manufacturers' Association (ETRMA) proposed to clarify the baking temperature of tyres. Task force members studied many documents to set the appropriate temperature. Finally, the temperature of baking tyres was decided based on the description of "bake" in US Tier 3 preamble, which was 50 °C or higher.

2.2 Type approval authority witness

32. During seventy-fourth session of GRPE, the International Motor Vehicle Inspection Committee (CITA) pointed out that the description in paragraph 5.3.11. of Annex 1 of UN GTR No. 19 "The manufacturer shall provide the responsible authority a test report" might be misleading and could be interpreted to mean that there is no chance of witness of evaporative emission test. Also at nineteenth session of the IWG on WLTP, Union Technique de l'Automobile, du motocycle et du Cycle (UTAC) pointed out the need for a clearer description of an audit or a witness test.

33. With much discussion between authorities and industry members, paragraph 5.3.11. of Annex 1 of UN GTR No. 19 (paragraph 8. of Annex 1 of Amendment 1 to UN GTR No. 19) was changed to delete the description pointed out by CITA. The description of an audit or a witness test raised by UTAC was decided not to be written in detail since how this should be done depends on each Contracting Party.

2.3 BWC measurement

34. Japan raised the concern that a result from measurement of BWC50 will never be used or submitted to an authority. After discussion within task force members, measurement of BWC50 was deleted from the test procedure. However, BWC300 measurement, which is used to decide evaporative emission family, remains and shall be done before certification test according to the procedure written in Amendment 1 to UN GTR No. 19.

Annex VI

Adopted amendments to ECE/TRANS/WP.29/GRPE/2018/10

Adopted on the basis of GRPE-76-16 (see para. 23)

Paragraph 4.6.2., amend to read:

"4.6.2. If the manufacturer permits the engine family to run on market fuels that do not comply neither with the reference fuels included in Annex 5 nor CEN standard EN 228 (in the case of unleaded petrol) or CEN standard EN 590 (in the case of diesel), such as running on FAME B100 (CEN standard EN14214), FAME diesel blends B20/B30 (CEN standard EN 16709), paraffinic fuel (CEN standard EN 15940) or others the manufacturer shall, in addition to the requirements in paragraph 4.6.1. comply with the following requirements:

(a) Declare the fuels the engine family is capable to run on in paragraph 3.2.2.2.1. of the Information Document as set out in Part 1 of Annex 1, either by reference to an official standard or to a production specification of a brand specific market fuel not meeting any official standard such as those mentioned in paragraph 4.6.2. The manufacturer shall also declare that the functionality of the OBD system is not affected by the use of the declared fuel;

(b) Determine the power correction factor for each fuel declared according to paragraph 9.4.2.8. if applicable according to the provisions specified in paragraph 9.4.2.7. Declare the factor for each fuel in 3.2.2.2.2. of the information document as set out in Part 1 of Annex 1 if applicable;

(c) Demonstrate that the parent engine meets the requirements specified in Annex 4 and in Appendix 1 of Annex 10 to this Regulation on the fuels declared; the approval authority may request that the demonstration requirements be further extended to those laid down in Annex 7 and Annex 9A;

(d) Be liable to meet the requirements of in-service conformity specified in Annex 8 on the fuels declared, including any blend between the declared fuels and the relevant market fuels and standards.

At the request of the manufacturer, the requirements set out in this paragraph shall be applied to fuels used for military purposes.

For the purposes of subparagraph 4.6.2.(a) where the emission tests are performed for demonstrating compliance with the requirements of this Regulation, a fuel analysis report of the test fuel shall be attached to the test report and shall comprise at least the parameters specified in the official specification of the fuel manufacturer."

Paragraphs 9.4.2.5. to 9.4.3.3.1., amend to read:

"9.4.2.5. The average load at each operating condition in Nm calculated from the information requested in paragraph 9.4.2.1. shall not differ from the average measured load at that operating condition by more than:

(a) 7 per cent when determining the engine power according to UN Regulation No. 85;

(b) 10 per cent when performing the World Harmonised Steady state Cycle (hereinafter "WHSC") **except for mode 1 and 13 (idle modes)** according to Annex 4, paragraph 7.7.

UN Regulation No. 85 allows the actual maximum load of the engine to differ from the reference maximum load by 5 per cent in order to address the manufacturing process variability. This tolerance is taken into account in the above values.

9.4.2.6. External access to the information required in paragraph 9.4.2.1. shall not influence the vehicle emissions or performance.

9.4.2.7. ~~**If the manufacturer permits to operate an engine family to run on market fuels according to paragraph 4.2.6. the calculated torque built by the ECU may comply also for those fuels with the requirements specified in paragraph 9.4.2.5. If in case of a CI engine**~~ **the difference between the measured torque value obtained with a declared market fuel according to paragraph 4.2.6. and the torque calculated from the information requested in paragraph 9.4.2.1. exceeds one of the values specified in paragraph 9.4.2.5. the following paragraph 9.4.2.8. applies.**

9.4.2.8. **A power correction factor for each additional market fuel permitted by the manufacturer** ~~**according to paragraph 4.2.6.**~~ **shall be determined for the engine family. The correction factor shall be calculated** ~~**from the**~~ **as the ratio between average measured peak torque [Nm]** ~~**with each**~~ **on the** ~~**market fuel**~~ **reference fuel according to Annex 5** ~~**declared**~~ **and average measured peak torque [Nm]** ~~**with**~~ **on the** ~~**reference fuel according to Annex 5**~~ **market fuel declared.**

$$\text{~~CP fuel}_{declared} = \frac{\text{~~M fuel}_{ref}}{\text{~~M fuel}_{declared}}$$

~~**Where:**~~

~~***M* fuel$_{declared}$, is the peak torque with the market fuel declared, Nm**~~

~~***M* fuel$_{ref}$ is the peak torque with the dedicated reference fuel, Nm**~~

9.4.3. Verification of the availability and conformity of the ECU information required for in-service testing

9.4.3.1. The availability of the data stream information required in paragraph 9.4.2.1. according to the requirements set out in paragraph 9.4.2.2. shall be demonstrated by using an external OBD scan-tool as described in Annex X.

9.4.3.2. In the case where this information cannot be retrieved in a proper manner, using a scan-tool that is working properly, the engine is considered as non-compliant.

9.4.3.3. The conformity of the ECU torque signal to the general requirements ~~**of points 9.4.2.2. and 9.4.2.3.**~~ **specified in paragraph 9.4.2.** shall be demonstrated when determining the engine power according to Annex XIV and when performing the WHSC test according to Annex III.

9.4.3.3.1. The conformity of the ECU torque signal to the requirements of paragraphs 9.4.2.~~**2. and 9.4.2.3.**~~ shall be demonstrated for each engine family member when determining the engine power according to **UN** Regulation No. 85. For this purpose additional measurements shall be performed at several part load and engine speed operating points (for example at the modes of the WHSC and some additional random points). **If applicable the power**

correction factor for the engine family according to 9.4.2.8. shall be determined with the parent engine of the engine family."

Annex 1,

Part 1, amend to read:

"

3.2.2.	Fuel						
3.2.2.2.	Heavy duty vehicles Diesel/Petrol/LPG/NG-H/NG-L/NG-HL/Ethanol (ED95)/ Ethanol (E85)[1]						
3.2.2.2.1.	Fuels compatible with use by the engine declared by the manufacturer in accordance with paragraph 4.6.2. of this Regulation (as applicable)						
3.2.2.2.2.	**Power correction factor according to paragraph 9.4.2.8. for each fuel declared (if applicable)**						

"

Annex 8,

Paragraphs 4.4.2. and 4.4.2.1., amend to read:

"4.4.2. Fuel

The test fuel shall be market fuel covered by the relevant standards or reference fuel as specified in Annex 5 to this Regulation. ~~Fuel samples shall be taken.~~

4.4.2.1. If the manufacturer in accordance with paragraph 4. to this Regulation has declared the capability to meet the requirements of this Regulation on market fuels declared in paragraph 3.2.2.2.1. of Part 1 of Annex 1 to this Regulation, tests shall be conducted on at least one of the declared market fuels ~~or blend between the declared market fuels and the market fuels covered by the relevant standards.~~"

Insert a new paragraph 4.4.2.2., to read:

"4.4.2.2. Fuel samples shall be taken."

Annex 8, Appendix 1,

Insert a new paragraph A.1.4.2.1.1., to read:

"A.1.4.2.1.1. Calculation of the specific emissions for a declared market fuel

If a test according to this Annex was performed with a market fuel declared in paragraph 3.2.2.2.1. of Part 1 of Annex 1 to this Regulation and a power correction factor in accordance with paragraph 3.2.2.2.2. of Part 1 of Annex 1 to this Regulation was documented for the market fuel used for the test, the specific emissions e_{gas} (mg/kWh) shall be calculated for each window and each pollutant ~~in the following way:~~ by

multiplication of the specific emissions with the declared power correction factor.

~~$e_{gas,korr} = e_{gas} \times CP\ fuel_{declared}$~~

~~**Where:**~~

~~e_{gas} — **is the specific emission (mg/kWh) according to A.1.4.2.1.**~~

~~$CP\ fuel_{declared}$ — **is the applicable power correction factor for the market fuel declared according to paragraph 3.2.2.2.2. of Part 1 of Annex 1 to this Regulation.**~~"

Annex 8, Appendix 4,

Insert a new paragraph A.4.2.1.1., to read:

"**A.4.2.1.1.** **If a market fuel declared in paragraph 3.2.2.2.1. of Part 1 of Annex 1 to this Regulation is used and a power correction factor in accordance with paragraph 3.2.2.2.2. of Part 1 of Annex 1 to this Regulation was documented for the dedicated market fuel used for the test, the ECU torque signal has to be ~~corrected with this documented~~muliplied by the inverted correction factor ~~when it will be verfied~~ prior to the varification with the reference maximum torque curve performed with this specific market fuel.**"

Annex VII

Adopted amendments to ECE/TRANS/WP.29/GRPE/2018/5

Adopted on the basis of GRPE-76-23 (see para. 29)

Paragraph 5.3.1.3., amend to read:

"5.3.1.3. ~~Just before beginning~~ **Immediately prior to** the test, the motor shall be run on the bench for three minutes delivering a power equal to ~~or higher than~~ **either** 80 per cent of the maximum ~~power~~ **30 minutes power or 80 per cent of the maximum peak power** at ~~the~~ **a** speed recommended by the manufacturer, **within the speed range determined in paragraph 5.3.2.2. Following the completion of this run, the power test shall be started within a maximum of 1 minute.**"

Annex 5, paragraph 5.4.2., amend to read:

"5.4.2. Diesel engines - Factor α_d

The power correction factor (α_d) for diesel engines at constant fuel rate is obtained by applying the formula:

Where $\alpha_d = (f_a)^{f_m}$

f_a is the atmospheric factor

f_m is the characteristic parameter for each type of engine and adjustment"

Annex VIII

Endorsed revised Terms of Reference of the IWG on VIAQ

Adopted on the basis of GRPE-76-27 (see para. 48)

Terms of reference and rules of procedure for the Informal Working Group on Vehicle Interior Air Quality (VIAQ)

1. Background

1.1. VIAQ informal working group developed a new Mutual Resolution on Vehicle Interior Air Quality taking into account emissions of chemical substances from the interior materials. This issue is linked to evaporative emissions from chemical compounds used in some of the vehicles' interior elements, such as the dashboard, seat etc. The mutual resolution contains provisions and harmonized test procedures for the measurement of interior air emissions from interior materials.

1.2. However, other important sources of air pollution in the vehicle cabin include harmful substances entering into the cabin through the heating, ventilation and air conditioning system (HVAC), and through other leaks in the vehicle cabin. The sources of these substances coming into the cabin include vehicle exhaust gases, fuel vapors, and the outside air pollution. The list of chemical substances includes CO, NO, NO_2, SO_2, volatile organic compounds (VOC), formaldehyde (CH_2O), aromatic and aliphatic hydrocarbons, particulate matter (PM).

1.3. The group considered the inclusion in the scope of interior air pollutants from outside sources as a possible extension of the mandate at this stage. As an extension of the existing Mutual Resolution on VIAQ, this will take into account both interior air emissions generated from interior materials and exhaust gases from the vehicle entering into the cabin. Since there are too many variables in regards to outside air pollution sources, this stage will not address outside air pollution originating from any source other than the vehicle itself.

2. Procedural background

2.1. At the seventy-fifth session of GRPE, the Chair of the IWG on Vehicles Interior Air Quality requested an extension of the mandate of the IWG on VIAQ until November 2020 to expand the work to consider not only emissions generated by interior materials but also gases from other sources that enter into the vehicle cabin. He introduced a first draft of the updated terms of reference and rules of procedure (GRPE-75-14) for this second stage of the work and expressed the group's intention to submit a final version at the next GRPE session in January 2018. For this second stage of the work, he noted that the Russian Federation would chair the IWG, together with Korea as Vice-Chair and OICA for the Secretary. He explained that the endorsement by GRPE at this session of the extension of the mandate of the IWG on VIAQ would allow the group to continue working without any interruption between the end of the current mandate and the next GRPE session in January 2018. He invited all Contracting Parties to be involved in the new stage of work (ECE/TRANS/WP.29/GRPE/75, para. 47).

2.2. At the 172nd WP.29 session, WP.29 endorsed the extension of the mandate of the IWG on VIAQ until November 2020 to extend the work to consider not only emissions generated by interior materials, but also gases from other sources that enter into the vehicle cabin. WP.29 noted that a first draft of the updated terms of reference and rules of procedure was submitted by the IWG on VIAQ at the June 2017 GRPE session (GRPE-75-14) and that a final version is expected to be considered by GRPE at its January 2018 session (ECE/TRANS/WP.29/1131, para. 44).

3. Objective

3.1. The VIAQ informal working group will have an open structure which will enable the exchange of information and experiences on relevant regulations, policy measures and harmonization efforts.

3.2. This proposal expands on the issues of the vehicle interior air quality, addressing exhaust gases entering into vehicle cabin air, to develop a test procedure in a recommendation by including Part 3 in the Mutual Resolution No. 3.

4. Terms of reference

4.1. The following terms of reference describe the main tasks of the IWG.

(a) Identify and collect the information and research data on interior air quality and its relevance for vehicles, taking into account the activities being carried out by various governments, and non-governmental organizations.

(b) Identify and understand the current regulatory requirements with respect to vehicle interior air quality in different markets.

(c) Identify, review and assess existing test procedures suitable for the measurement of harmful substance into the vehicle cabin (including test modes, sample collection methods and analysis methods, etc.)

(d) Develop provisions and test procedures in a recommendation by including Part 3 in the Mutual Resolution No. 3.

5. Timeline

5.1. The work of the group on Vehicle Interior Air Quality should be completed by November 2020. An extension of the mandate of the group should be considered in due time by GRPE, if necessary.

(a)	January 2018:	Discussion for the directions and working items
(b)	January 2019 :	Start working with draft document
(c)	January 2020:	Submit the draft document to GRPE
(d)	June 2020:	Adoption of the draft document by GRPE
(e)	November 2020:	Adoption of the draft document by WP.29

6. Scope and work items

6.1. Interior air emissions emitted from interior materials

(a) Continue to work, review, and assess the harmonized test procedures

(b) Update the interior emissions sections for the Mutual Resolution

6.2 Exhaust gases entering into vehicle cabin air

(a) Collect the information and research data on relevant and similar issues, and understand the current regulatory requirements with respect to vehicle interior air quality in different markets

(b) Review, assess and develop new test procedures suitable for the measurement methods of exhaust gases entering into the vehicle cabin (including test modes, sample collection methods and analysis methods, etc.)

(c) Discuss the potential of harmful substances in the vehicle interior air with toxicologists (e.g. WHO).

(d) Develop a draft for test procedures in a recommendation.

7. Rules of procedure

7.1. The following rules of procedure describe the functioning principles of the informal working group.

(a) The IWG is open to all participants from any country or organization of WP.29 and its subsidiary bodies. A limitation of the number of participants for the IWG is not foreseen.

(b) A Chair (Russian Federation), a vice chair (Republic of Korea) and a Secretary (OICA) will manage the IWG.

(c) The official language of the IWG will be English.

(d) All documents and/or proposals shall be submitted to the secretary of the group in a suitable electronic format, preferably in line with the UNECE guidelines in advance of the meetings. The group may refuse to discuss any item or proposal which has not been circulated 5 working days in advance of the scheduled meetings.

(e) The informal group shall meet regularly in conjunction with the GRPE sessions, presuming the availability of meeting rooms. Additional meetings will be organized upon demand.

(f) An agenda and related documents will be circulated to all members of the informal working group in advance of all scheduled meetings.

(g) The work process will be developed by consensus. When consensus cannot be reached, the Chair of the informal group shall present the different points of view to GRPE. The Chair may seek guidance from GRPE as appropriate.

(h) The progress of the informal group will be routinely reported to GRPE orally or as an informal document by the Chair or the secretary.

(i) All working documents shall be distributed in digital format. The specific VIAQ section on the UNECE website shall continue to be utilised.

Annex IX

Adopted amendments to ECE/TRANS/WP.29/GRPE/2018/3

Adopted on the basis of GRPE-76-12 (see para. 32)

In ECE/TRANS/WP.29/GRPE/2018/3,

Add new paragraph to the scope, to read:

"1.2. This UN Regulation shall not apply to monitoring of emissions of pollutants from engines operated in category T vehicles or non-road mobile machinery over their normal patterns, conditions and payloads."

Paragraph 2.1.11., amend to read:

"2.1.11. "*Constant-speed engine*" means an engine **the** type-approval of which is limited to constant-speed operation, excluding engines the constant-speed governor function of which is removed or disabled; it may be provided with an idle speed that can be used during start-up or shut-down and it may be equipped with a governor that can be set to an alternative speed when the engine is stopped;"

Paragraph 2.1.30., amend to read:

"2.1.30. "*Engine type*" means a group of engines which do not differ in such essential engine characteristics **as defined in Annex 10 to this UN Regulation;"**

Paragraph 4.3.8.(a), amend to read:

"(a) The trademark or trade name of the manufacturer of the engine **and the address at which it can be contacted;"**

Paragraph 5.5., amend to read:

"5.5. Engine types and engine families shall be designed and fitted with emission control strategies in such a way as to prevent tampering to the extent possible. **For this purpose, paragraphs 3 and 4 of Annex 9 and Appendix A.3 of Annex 9 shall apply."**

Paragraph 12.4., amend to read:

"12.4 Contracting Parties applying this Regulation may continue to grant approvals to those engines which comply with any previous sets of requirements, or to any level of this Regulation provided that the engines or the vehicles are intended for export to countries that apply the relating requirements in their national legislations. **Markings for these engines shall maintain the format defined in the relevant series of amendments to this UN Regulation."**

Paragraph 12.6., shall be deleted:

~~12.6 As from the dates set out in paragraph 12.3 of this Regulation, and by way of derogation to the obligations of Contracting Parties, the Contracting Parties applying this Regulation and also applying in their national/regional territory monitoring of in-service engines, may no longer accept type approvals granted on the basis of this Regulation as an alternative to compliance with their national/regional legislation, unless the requirements for monitoring of in-service engines are fulfilled as prescribed in the national/regional legislation.~~

Title of Appendix 1 to paragraph 5, amend to read:

"**Stage V exhausts** emission limits"

Paragraph 1.9. of Annex 1, amend to read:

1.9. Manufacturer's declaration and supporting data demonstrating that the emission control strategies fitted are designed in such a way as to prevent tampering to the extent possible, as referred to in paragraph **5.5** and Appendix 3 to Annex 9 of this Regulation.

Paragraph 2.3.3. of Annex 1, amend to read:

2.3.3. **Number of characters.**

The number of characters shall not exceed the following:

(a) 15 for the engine family designation;

(b) 25 for the engine type designation;

(c) 40 for the FT.

Paragraph 2.3.4. of Annex 1, amend to read:

2.3.4. **Characters allowed.**

The engine type designation and engine family designation shall be made up of Roman letters and/or Arabic numerals;

Paragraph 2.3.4.2.1. of Annex 1, amend to read:

2.3.4.2.1. The reasons for using such variable characters shall be explained to the technical service and **Type Approval Authority**.

Paragraph 2. of Annex 1-Appendix A.3, amend to read:

"2. COMMON DESIGN PARAMETERS OF ENGINE FAMILY([1]) "

Annex 2, amend "Addendum" to read:

"ADDENDUM"

Add new paragraphs 11.3., 11.3.1. and 11.3.2. of Annex 2 Addendum Part B, to read:

"11.3. Reference values in case the contracting party requires to conduct in-service monitoring tests

11.3.1. NRTC reference work (kWh):

11.3.2. NRTC reference CO_2 (g):"

Amend paragraph 10.3.1. of paragraph A.1.3. of Annex 2, Appendix A.1, to read:

"10.3.1 Hot cycle CO_2 (g/kWh):"

Add new paragraphs 11.3., 11.3.1. and 11.3.2. of paragraph A.1.3. of Annex 2, Appendix A.1:

"11.3. Reference values in case the contracting party requires to conduct in-service monitoring tests

11.3.1. NRTC reference work (kWh)([5]):

11.3.2. NRTC reference CO_2 (g)([6]):"

Add new footnotes ([5]) and ([6]) of paragraph A.1.3. of Annex 2 – Appendix A.1:

"([5]) Where engine is tested on NRTC record value from 10.3.3., otherwise leave blank

(*) **Where engine is tested on NRTC record value from 10.3.4., otherwise leave blank"**

Paragraph 5.2.5.2. of Annex 4, amend to read:

"5.2.5.2. Rated speed

The rated speed is defined in paragraph 2.1.72. Rated speed for variable speed engines subject to an emission test **other than those tested on a constant-speed NRSC defined in paragraph 2.1.12.** shall be determined from the applicable mapping procedure set out in paragraph 7.6.. **Rated speed for variable-speed engines tested on a constant-speed NRSC shall be declared by the manufacturer according to the characteristics of the engine.** Rated speed for constant speed engines shall be declared by the manufacturer according to the characteristics of the governor. Where an engine type equipped with alternative speeds as permitted by paragraph 2.1.11 of this Regulation is subject to an emission test, each alternative speed shall be declared and tested.

If the rated speed determined from the mapping procedure in paragraph 7.6. is within ± 150 rpm of the value declared by the manufacturer for engines of category NRS provided with governor, or within ± 350 rpm or ± 4 per cent for engines of category NRS without governor, whichever is smaller, or within ± 100 rpm for all other engine categories, the declared value may be used. If the tolerance is exceeded, the rated speed determined from the mapping procedure shall be used.

For engines of category NRSh the 100 % test speed shall be within ± 350 rpm of the rated speed **declared by the manufacturer**.

Optionally, MTS may be used instead of rated speed for any steady state test cycle."

Paragraph 5.2.5.3. of Annex 4, amend to read:

"5.2.5.3. Maximum torque speed for variable speed engines

Where required, the maximum torque speed determined from the maximum torque curve established from the applicable engine mapping procedure in paragraph 7.6.1 or 7.6.2. shall be one of the following:

(a) The speed at which the highest torque was recorded; or,

(b) The average of the lowest and highest speeds at which the torque is equal to 98 per cent of the maximum torque. Where necessary, linear interpolation shall be used to determine the speeds at which the torque is equal to 98 per cent of the maximum torque.

If the maximum torque speed determined from the maximum torque curve is within ± 4 per cent of the maximum torque speed declared by the manufacturer for engines of category NRS ~~or NRSh~~, or ± 2,5 per cent of the maximum torque speed declared by the manufacturer for all other engine categories, the declared value may be used for the purpose of this regulation. If the tolerance is exceeded, the maximum torque speed determined from the maximum torque curve shall be used."

Paragraph 8.1.9.1.4.(b) of Annex 4, amend to read:

"(b) A humidified test gas shall be created by bubbling zero air that meets the specifications in paragraph 9.5.1 **of this Annex** through distilled water in a sealed vessel. If the sample is not passed through a dryer, control the vessel

temperature to generate an H_2O **content in the test gas** at least as high as the maximum expected during testing. If the sample is passed through a dryer during testing, control the vessel temperature to generate an H_2O **content in the test gas** at least as high as **the maximum expected at the outlet of the dryer, according to the requirements** in paragraph **9.3.2.3.1.1. of this Annex**;"

Paragraph 8.1.9.2.4.(b) of Annex 4, amend to read:

"(b) A humidified CO_2 test gas shall be created by bubbling a CO_2 span gas through distilled water in a sealed vessel. If the sample is not passed through a dryer, control the vessel temperature to generate an H_2O **content in the test gas** at least as high as the maximum expected during testing. If the sample is passed through a dryer during testing, control the vessel temperature to generate an H_2O **content in the test gas** at least as high as **the maximum expected at the outlet of the dryer, according to the requirements** in paragraph 9.3.2.3.1.1. of this Annex. A CO_2 span gas concentration shall be used at least as high as the maximum expected during testing;"

Paragraph 8.1.11.1.5.(e) of Annex 4, amend to read:

"(e) The NO span gas shall be humidified by bubbling it through distilled water in a sealed vessel. If the humidified NO span gas sample does not pass through a sample dryer for this verification test, the vessel temperature shall be controlled to generate an H_2O **content in the span gas** approximately equal to the maximum mole fraction of H_2O expected during emission testing. If the humidified NO span gas sample does not pass through a sample dryer, the quench verification calculations in paragraph 8.1.11.2.3. of this Annex scale the measured H_2O quench to the highest mole fraction of H_2O expected during emission testing. If the humidified NO span gas sample passes through a dryer for this verification test, the vessel temperature shall be controlled to generate an H_2O **content in the span gas** at least as high as **the maximum expected at the outlet of the dryer, according to the requirements** set out in paragraph 9.3.2.3.1.**1.** of this Annex. For this case, the quench verification calculations set out in paragraph 8.1.11.2.3. of this Annex do not scale the measured H_2O quench;"

Paragraph A.1.2.1.1.1. of Annex 4-Appendix A.1, amend to read:

"A.1.2.1.1.1. The particle sampling system shall consist of a probe or sampling point extracting a sample from a homogenously mixed flow in a dilution system as described in paragraph 9.2.2. or 9.2.3.of this Annex, a volatile particle remover (VPR) upstream of a particle number counter (PNC) and suitable transfer **line**."

Paragraph A.1.2.1.2.1. of Annex 4-Appendix A.1 (second sub-paragraph), amend to read:

" The sampling probe tip or particle sampling point and particle transfer **line** (PTL) together comprise the particle transfer system (PTS). The PTS conducts the sample from the dilution tunnel to the entrance of the VPR. The PTS shall meet the following conditions:"

Paragraph A.1.2.1.2.1.(b) of Annex 4-Appendix A.1, amend to read:

"(b) In the case of partial flow dilution systems of the total sampling type (as described in paragraph 9.2.3.of this Annex) the particle sampling point or sampling probe shall be located in the particulate transfer

line, upstream of the particulate filter holder, flow measurement device and any sample/bypass bifurcation point. The sampling point or sampling probe shall be positioned so that the sample is taken from a homogeneous diluent/exhaust mixture. The dimensions of the particle sampling probe should be sized not to interfere with the operation of the partial flow dilution system."

Paragraph A.1.2.1.4.1. of Annex 4-Appendix A.1, amend to read:

"A.1.2.1.4.1. The particle sampling system shall consist of a sampling probe tip or particle sampling point in the dilution system, a particle transfer **line** (PTL), a particle preclassifier (PCF) and a volatile particle remover (VPR) upstream of the particle number concentration measurement (PNC) unit. The VPR shall include devices for sample dilution (particle number diluters: PND1 and PND2) and particle evaporation (Evaporation tube, ET). The sampling probe or sampling point for the test gas flow shall be so arranged within the dilution tract that a representative sample gas flow is taken from a homogeneous diluent/exhaust mixture. The sum of the residence time of the system plus the response time of the PNC shall be no greater than 20 s."

Paragraph A.1.2.1.4.2. of Annex 4-Appendix A.1 (first sub-paragraph), amend to read:

" The sampling probe tip or particle sampling point and particle transfer **line** (PTL) together comprise the particle transfer system (PTS). The PTS conducts the sample from the dilution tunnel to the entrance to the first particle number diluter. The PTS shall meet the following conditions:"

Paragraph A.1.2.1.4.2. of Annex 4-Appendix A.1 (third sub-paragraph), amend to read:

" In the case of partial flow dilution systems of the total sampling type (as described in paragraph 9.2.3. of this Annex) the particle sampling point shall be located in the particulate transfer **line**, upstream of the particulate filter holder, flow measurement device and any sample/bypass bifurcation point. The sampling point or sampling probe shall be positioned so that the sample is taken from a homogeneous diluent/exhaust mixture."

Paragraph 2.4.15. of Annex 10 (second sub-paragraph), amend to read:

"In addition to belonging to the same dual-fuel type, they shall have a maximum gas energy ratio on the applicable test cycle (GER_{cycle}) within the range 70 to 100 per cent of that of the engine type with the highest GER_{cycle}."

Add new paragraph 2.4.16. of Annex 10:

"2.4.16. Reserved"